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(54) **Air bag activated knee bolster**

Luftsack-betätigtes Kniepolster

Dispositif de protection des genoux mis en place par sac gonflable

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Description

The present invention relates to automotive safety restraint devices and more particularly, to an improved knee bolster which is deployed rearwardly in a vehicle during a crash to provide lower torso restraint.

Automotive vehicles provided with safety restraint devices including inflatable air bags are currently being designed with a stationary panel, located on a downward and forwardly inclined portion of the instrument panel, which panel acts as a knee crush zone. The portion of the instrument panel enclosed in the knee crush zone is classified as a "knee bolster." During a crash, momentum causes the occupant to move forward and the legs of the occupant contact the knee bolster. This prevents or stops the occupant from submarining underneath the inflated air bag. The knee bolster then deforms or crushes under the load, absorbing energy and minimizing the forces acting on the occupant's legs.

Inflatable air bag devices that have heretofore been proposed are located in the passenger compartment of automotive vehicles and act as a cushion when deployed to safely restrain passengers in the event of a crash. Such devices comprise an inflatable air bag module stored behind the instrument panel of the vehicle. An inflatable air bag cushion deployed from an air bag module located behind the instrument panel is positioned to absorb the momentum and thereby protect a seated passenger.

The onset of a crash is detected by a sensor which activates an inflation device, which device is internally located in the air bag module and produces a flow of inflating gas into the inflatable air bag. This causes the air bag to be deployed as a protective cushion for the occupants within the vehicle passenger compartment.

As installed behind the vehicle instrument panel, the inflatable air bag is in folded condition. The folded air bag and the inflation device are contained within a reaction canister of the air bag module, which canister is provided with a generally rectangular cover. The cover also comprises the cover or door for an air bag deployment opening that is formed in a portion of the instrument panel.

The use of a crushable stationary panel on the instrument panel of an automotive vehicle to provide a knee crush zone or bolster is disadvantageous. This is because the reduction in the distance between the occupant's knees and the instrument panel detracts from and diminishes the amount of leg room and the feeling of roominess the occupant would prefer to retain.

GB-A-2263669 discloses the positioning of an air bag adjacent a steering column to protect the driver's legs in the event of a crash.

JP-A-6-32195 discloses an automotive safety restraint device comprising an air bag activated panel or knee bolster which is deployed rearwardly in the vehicle during a crash to provide lower torso restraint. The panel is connected to the airbag housing by a sliding

and pivoting linkage device which limits its travel away from the housing.

JP-A-53 38513 discloses the use of flexible tethers to restrain a side door panel that has been displaced by an activated airbag.

US-A-4198075 discloses a knee impact panel which is pivotally supported along one edge and is deployed and restrained by an air bag system.

Such devices allow automotive vehicle designers the flexibility to provide increased leg room for the occupant without increasing the potential for injury during a crash. There remains however a need to lower the deployment velocity of the air bag activated panel or knee bolster to reduce the potential for injury to an out-of-position occupant.

The present invention consists in an air bag activated knee bolster which is deployed in an automotive vehicle during a crash to provide lower torso restraint for an occupant seated therein comprising a support member located behind a downward and forwardly inclined portion of the instrument panel of the vehicle, a housing securely mounted to said support member, an inflator mounted in said housing, a folded air bag stored in said housing, a knee bolster panel for said inflator and said air bag stored in said housing, said panel also comprising the door for an air bag deployment opening that is formed in a portion of the instrument panel of said automotive vehicle, attaching means positioning said knee bolster panel in the air bag deployment opening that is formed in a portion of the instrument panel of the automotive vehicle, and tether means to limit the rearward movement of said knee bolster panel during deployment whereby the inflated air bag in combination with said tether means positions said knee bolster panel in the proper location to provide lower torso restraint for the occupant seated in said vehicle, characterised in that said tether means is located within the folded air bag and comprises spaced parallel tethers and at least one diagonal tether, with a first end of each of said tethers attached to said housing and the diagonal tether arranged to constrain the knee bolster panel, upon deployment, to move in an arc, determined by the length of the diagonal tether, thereby reducing the impact loading on the tethers. The occupant's knees hit the panel during a crash and slow the forward motion of the lower torso. During deployment, pressure acting on the back of the panel from the inflating air bag creates a force sufficient to separate the knee bolster panel from the instrument panel. The inflated air bag (vented or unvented) in combination with the tethers position the panel in the proper location. The inflated air bag resists the rearward movement of the panel during occupant impact. The inflator used to inflate the air bag can be a pyrotechnic or stored gas type of inflator. The cushion can be fabricated from nylon or polyester cloth.

With this description of the invention, a detailed description follows with reference being made to the accompanying figures of drawing which form part of the

specification, in which like parts are designated by the same reference numerals, and of which:

Fig. 1 is a schematic side view illustration typifying the prior art knee bolsters comprising a deformable or crushable stationary panel located on the vehicle instrument panel;

Fig. 2 is a schematic side illustration of the deployment of knee bolster according to the invention;

Fig. 3 is a schematic side view of an activated knee bolster according to the invention provided with tethers to limit the rearward movement of the panel during deployment and including a stabilizing positioning tether;

Fig. 4 is an isometric or perspective view prior to deployment of the knee bolster shown in Fig. 3;

Fig. 5 is a cross sectional view of the Fig. 3 knee bolster prior to deployment and illustrates the arrangement of the normally stored inflatable air bag and internally located;

Fig. 6 is a schematic view showing a modified way to attach the knee bolster panel to the knee bolster housing;

Fig. 7 is a view illustrating a tear tab used in the modified attachment arrangement shown in Fig. 6;

Fig. 1 schematically illustrates the passenger compartment 10 of an automotive vehicle. Arranged within the compartment 10 are an instrument panel 12 and the forwardly extended leg 14 of an occupant (not shown) seated in the compartment 10.

In Fig. 1 the portion 16, indicated in dotted lines on the rearward facing side of the instrument panel at a downward forwardly inclined portion thereof and encased in a knee crush zone 18, is classified as a knee bolster. During a crash the occupant moves forward and the occupant's legs contact the knee bolster 16, preventing or stopping the occupant from submarining under the inflated cushion (not shown) of the associated air bag device. The knee bolster 16 then deforms or crushes under the load, absorbing energy and minimizing the forces acting on the occupant's legs.

Referring to Fig. 2, an activated knee bolster 20 is shown positioned on the downward forwardly inclined portion of the rearward facing side of the vehicle instrument panel 12. The activated knee bolster 20 includes a reaction canister or housing 22, an inflator 24, an inflatable air bag 26 that is stored within the reaction canister 22, and a knee bolster panel 28. Housing or reaction canister 22 is a wide, shallow, pan-shaped vessel. The knee bolster panel 28 comprises the door for an air bag deployment opening that is formed in a portion of the instrument panel 12 of the automotive vehicle. In Fig. 2 the knee bolster panel 28 also is shown by dotted lines in a deployed position closer to the leg 14 of the occupant. Panel 28 is attached to the housing 22 by attaching means comprising plastic fasteners such as push-in rivets 30, or any other suitable means. By such attach-

ment the knee bolster panel 28 is positioned in closing relation to the opening for air bag deployment that is formed in a portion of the instrument panel 12 of the vehicle.

The activated knee bolster 20 is located on the passenger side or driver side of the vehicle. It encompasses the entire area where an occupant's knees contact the instrument panel during a crash. The approximate dimensions of the bolster panel 28 are 25 x 51 cm (10" x 20").

During a crash the knee bolster panel 28 deploys rearwardly in the vehicle, as illustrated in Fig. 2. This reduces the distance between the occupant's knees 32 and the knee bolster panel 28, resulting in a lower force acting on the legs of the occupant during impact thereof with the knee bolster panel 28.

Use of an activated knee bolster 28 allows automotive designers the flexibility to increase the distance between the occupant and the instrument panel 12 without compromising on safety.

As shown in Fig. 3, support members or mounting brackets 34 are located within a cavity 36 behind the instrument panel 12 by any suitable means, being attached to an integral element of the automotive vehicle, or optionally, comprising such integral elements themselves if in proper location to permit such use thereof.

Activated knee bolster 20, comprising reaction canister 22, inflator or gas generator 24, inflatable air bag 26 and knee bolster panel 28, is fastened to the mounting brackets 34 at a position behind the instrument panel 12 at a forward downward sloping portion thereof.

Inflator 24 may be a pyrotechnic type, as disclosed, for example, in U. S. Patent No. 4,943,086 to Donald J. Cunningham, which patent is assigned to the assignee of the present invention. As shown in Fig. 5, inflator 24 is characterized in that the gas generated thereby flows generally radially outwardly from a plurality of ports 38. The ports 38 are arranged at substantially equal intervals around the circumference of the inflator portion 40, which portion 40 is substantially circular in transverse cross section and is contained in sealed relation within the inflator air bag 26.

The air bag 26 may be made of coated or uncoated nylon or polyester cloth material.

As indicated in Fig. 3, when deployed the air bag 26 is tubular in shape having a rectangular cross section. At one end of the tubular arrangement thereof, the air bag 26 is securely attached in any suitable sealing conventional manner, as by means of a suitable retaining ring 42, to the reaction canister 22, internally and adjacent the periphery thereof. At the other end thereof the air bag 26, when deployed, engages the forward facing wall 44 of the knee bolster panel 28.

When installed in the automotive vehicle, as illustrated in Fig. 5, the air bag 26 is suitably folded and stored in the housing or reaction canister 22 between the inflator 24 and the panel 28.

As previously mentioned, the invention is a tethered panel knee bolster which is deployed rearward in the vehicle during a crash to provide lower torso restraint. The knee bolster is an air bag system which propels the panel 28 rearward during deployment.

During deployment, pressure acting on the back of the panel 28 from the inflating air bag 26 creates a force sufficient to separate the panel 28 from the housing 22. This allows the rearward movement of the panel 28. The inflated air bag 26 resists the rearward movement of the panel 28 during occupant impact.

Tethers are provided, in accordance with the invention, to provide additional forces to resist the propelled or rearwardly urged movement of the panel 28 when activated. Each of the tethers employed comprises a polyester or nylon strap about 25 mm (1 inch) wide and a thickness of 1.3 to 2.5 mm (50 to 100 mil).

As shown in Figs. 3 and 5, spaced parallel tethers 46 and 48 and a diagonal or positional tether 50 are located internally of the inflatable air bag 26. One end of each of the tethers 46, 48 and 50 is securely attached to the reaction canister or housing 22 by the retaining ring 42. The other end of each of the tethers 46, 48 and 50 is attached to the forward facing side of the panel 28 by a retaining ring 52 which is positioned internally of the air bag 26. The inflating gas inlet or mouth of the air bag 26 is also attached to the housing 22 by the retaining ring 42.

The spaced parallel tethers 46 and 48 and the positional tether 50 are contained inside of the inflatable air bag or bladder 26 so as not to interfere with the deployment of the inflating air bag. The diagonal or positional tether 50 is used to position the panel 28 in the proper location. The positional tether 50 adds stability to the system during impact and positions the panel 28 in the proper location. Ideally, the positional tether 50 is taut when in the retracted position, as indicated in Fig. 5. The tether 50 does not, however, need to be taut in the retracted position to position the panel 28 and provide stability.

The retaining ring 52 may be "E" shaped so that all of the tethers 46, 48 and 50 are attached to the forward facing side 44 of the knee bolster panel 28 at a position substantially midway the width thereof.

The positional tether 50 provides the following advantages:

- (1) reduces the impact loading on the tethers since the panel 28 is forced to move along an arc determined by the length of the tether 50;
- (2) minimizes vertical distance that the panel 28 travels during deployment, that is, minimizes the degree to which the panel 28 will be out-of-position; and
- (3) increases the stability of the panel 28 during occupant loading.

The inflated air bag 26 provides support to the entire

surface area of the panel 28. Tethers 46 and 48 are attached to the panel 28 and the housing 22 at positions midway the width thereof.

Figs. 6 and 7 illustrate a modification in the attachment of the knee bolster panel 28 to the housing 22. Instead of utilizing plastic fasteners such as rivets and studs 30, as shown in Fig. 2, there are provided two tear tabs 54 and 56 which may extend along the opposed vertical walls of the housing 22 for the full length thereof, being attached thereto by rivets 58, which tear tabs 54 and 56 are attached in a suitable manner to the forwardly extending wall 44 of the panel 28.

Tear tabs 54 and 56, as employed in Fig. 6, are shown in greater detail in Fig. 7. As shown in Fig. 7, each of the tear tabs 54 and 56 includes perforated tear areas 60 and spaced holes 62 for facilitating attachment by rivets 58 to the walls of the housing 22. The tear strength of the tear tabs 54 and 56 can be varied by changing the distance between the perforated tear areas 60.

Claims

1. An air bag activated knee bolster (20) which is deployed in an automotive vehicle during a crash to provide lower torso restraint for an occupant seated therein comprising,

a support member (34) located behind a downward and forwardly inclined portion of the instrument panel (12) of the vehicle,
 a housing (22) securely mounted to said support member,
 an inflator (24) mounted in said housing,
 a folded air bag (26) stored in said housing,
 a knee bolster panel (28) for said inflator and said air bag stored in said housing, said panel also comprising the door for an air bag deployment opening that is formed in a portion of the instrument panel of said automotive vehicle,
 attaching means (30) positioning said knee bolster panel in the air bag deployment opening that is formed in a portion of the instrument panel (12) of the automotive vehicle, and
 tether means (46, 48, 50) to limit the rearward movement of said knee bolster panel during deployment whereby the inflated air bag in combination with said tether means positions said knee bolster panel in the proper location to provide lower torso restraint for the occupant seated in said vehicle, characterised in that said tether means is located within the folded air bag and comprises spaced parallel tethers (46, 48) and at least one diagonal tether (50), with a first end of each of said tethers attached to said housing and the diagonal tether arranged to constrain the knee bolster panel, upon deployment, to move in an arc, deter-

mined by the length of the diagonal tether, thereby reducing the impact loading on the tethers.

2. An air bag activated knee bolster, as defined in claim 1, 5
 wherein said attaching means (30) comprises means attaching said knee bolster panel (28) to said housing (22).
3. An air bag activated knee bolster, as defined by claim 2 wherein said attaching means (30) comprises plastic fasteners. 10
4. An air bag activated knee bolster, as defined by claim 3 wherein said plastic fasteners (30) comprise push-in rivets designed to break at a predetermined force. 15
5. An air activated knee bolster, as defined by claim 2, wherein said attaching means comprises tear tabs (54, 56) having perforated tear areas (60) designed to break at a predetermined force attaching said knee bolster panel to said housing (22). 20
6. An air bag activated knee bolster, as defined by any one of claims 2 to 5, wherein upon activation of said inflator (24) and deployment of said air bag (26), pressure acting on the back of said knee bolster panel (28) from the inflating air bag create a force sufficient to separate said knee bolster panel from said housing (22), thereby allowing rearward movement of said knee bolster panel during deployment. 25
7. An air bag activated knee bolster, as defined by any preceding claim, wherein said tether means (46, 48, 50) comprises a polyester strap about 2.5 cm (one inch) wide. 30
8. An air bag activated knee bolster, as defined by any one of claims 1 to 6, wherein said tether means (46, 48, 50) comprises a nylon strap about 2.5 cm (one inch) wide. 35
9. An air bag activated knee bolster as defined by claim 7 or claim 8 wherein the strap has a thickness of 1.27 to 2.54 mm (fifty thousandths to one tenth of an inch). 40
10. An air bag activated knee bolster as defined by any preceding claim wherein when inflated the cross section of said air bag (26) is that of a rectangle, and wherein said tether means (46, 48, 50) comprises a polyester or nylon strap folded back and forth between said housing and said knee bolster panel (28). 45
11. An air bag activated knee bolster as defined by any 50

preceding claim wherein said air bag (26) is fabricated from nylon cloth.

12. An air bag activated knee bolster as defined by any one of claims 1 to 10 wherein said air bag is fabricated from polyester cloth material.

13. An air bag activated knee bolster as defined by any preceding claim wherein said diagonal tether (50) is so arranged as to be taut when said knee bolster panel (28) is in a retracted position. 55

Patentansprüche

1. Airbagbetätigtes Kniepolster (20), das während eines Zusammenstoßes in einem Kraftfahrzeug entfaltet wird, um eine untere Körperückhaltevorrückung für einen darin sitzenden Insassen zu bilden, mit

einem Trägerteil (34), das hinter einem abwärts und nach vorn geneigten Abschnitt der Instrumententafel (12) des Fahrzeuges liegt,

einem Gehäuse (22), das fest an dem Trägerteil befestigt ist,

einer Aufblaseeinrichtung (24), die in dem Gehäuse angeordnet ist,

einem gefalteten Airbag (26), der in dem Gehäuse gelagert ist,

einer Kniepolsterplatte (28) für die Aufblaseeinrichtung und den in dem Gehäuse gelagerten Airbag, wobei diese Platte auch das Tor für eine Airbagentfaltungsöffnung umfaßt, die in einem Abschnitt der Instrumententafel des Kraftfahrzeuges gebildet wird,

einer Befestigungseinrichtung (30), die die Kniepolsterplatte in der Airbagentfaltungsöffnung positioniert, die in einem Teil der Instrumententafel (12) des Kraftfahrzeuges gebildet ist, und

einer Halteseileinrichtung (46, 48, 50), um die Rückwärtsbewegung der Kniepolsterplatte während der Entfaltung zu begrenzen, wodurch der aufgeblasene Airbag in Verbindung mit der Halteseileinrichtung die Kniepolsterplatte in geeigneter Stellung positioniert, um eine untere Körperückhalteeinrichtung für den in dem Fahrzeug sitzenden Insassen zu liefern,

dadurch gekennzeichnet, daß die Halteseileinrichtung in dem gefalteten Airbag angeordnet ist und parallele Halteseile (46, 48) im

Abstand voneinander und wenigstens ein diagonales Halteseil (50) aufweist, wobei ein erstes Ende jedes der Halteseile an dem Gehäuse befestigt ist und das diagonale Halteseil so angeordnet ist, daß es die Kniepolsterplatte bei der Entfaltung dazu zwingt, sich in einem Bogen zu bewegen, der durch die Länge des diagonalen Halteseils bestimmt wird, und so die Schlagbelastung auf die Halteseile zu vermindern.

2. Airbagbetätigtes Kniepolster nach Anspruch 1, bei dem die Befestigungseinrichtung (30) eine Einrichtung umfaßt, die die Kniepolsterplatte (28) an dem Gehäuse (22) befestigt.
3. Airbagbetätigtes Kniepolster nach Anspruch 2, bei dem die Befestigungseinrichtung (30) Kunststoffverbindungsteile umfaßt.
4. Airbagbetätigtes Kniepolster nach Anspruch 3, bei dem die Kunststoffverbindungsteile (30) Eindrücknieten umfaßt, die dazu bestimmt sind, bei einer vorbestimmten Kraft zu brechen.
5. Airbagbetätigtes Kniepolster nach Anspruch 2, bei dem die Befestigungseinrichtung Reißungen (54, 56) umfaßt, die perforierte Reißzonen (60) hat, welche dazu bestimmt sind, bei einer vorbestimmten Kraft zu brechen, wobei die Kniepolsterplatte an dem Gehäuse (22) befestigt ist.
6. Airbagbetätigtes Kniepolster nach einem der Ansprüche 2 bis 5, bei dem bei Betätigung der Aufblaseinrichtung (24) und Entfaltung des Airbags (26) auf die Rückseite der Kniepolsterplatte (28) von dem sich aufblasenden Airbag einwirkender Druck eine ausreichende Kraft erzeugt, um die Kniepolsterplatte von dem Gehäuse (22) zu trennen und dadurch eine Rückwärtsbewegung der Kniepolsterplatte während der Entfaltung zu gestatten.
7. Airbagbetätigtes Kniepolster nach einem der vorausgehenden Ansprüche, bei dem die Halteseileinrichtung (46, 48, 50) ein Polyesterband mit einer Breite von etwa 2,5 cm (1 in) umfaßt.
8. Airbagbetätigtes Kniepolster nach einem der Ansprüche 1 bis 6, bei dem die Halteseileinrichtung (46, 48, 50) ein Nylonband mit einer Breite von etwa 2,5 cm (1 in) umfaßt.
9. Airbagbetätigtes Kniepolster nach Anspruch 7 oder 8, bei dem das Band eine Dicke von 1,27 bis 2,54 mm (50/1000 bis 1/10 in) hat.
10. Airbagbetätigtes Kniepolster nach einem der vor-

ausgehenden Ansprüche, bei dem der Querschnitt des Airbags (26) in aufgeblasenem Zustand der eines Rechtecks ist und bei dem die Halteseileinrichtung (46, 48, 50) ein Polyester- oder Nylonband umfaßt, das zwischen dem Gehäuse und der Kniepolsterplatte (28) hin- und hergefaltet ist.

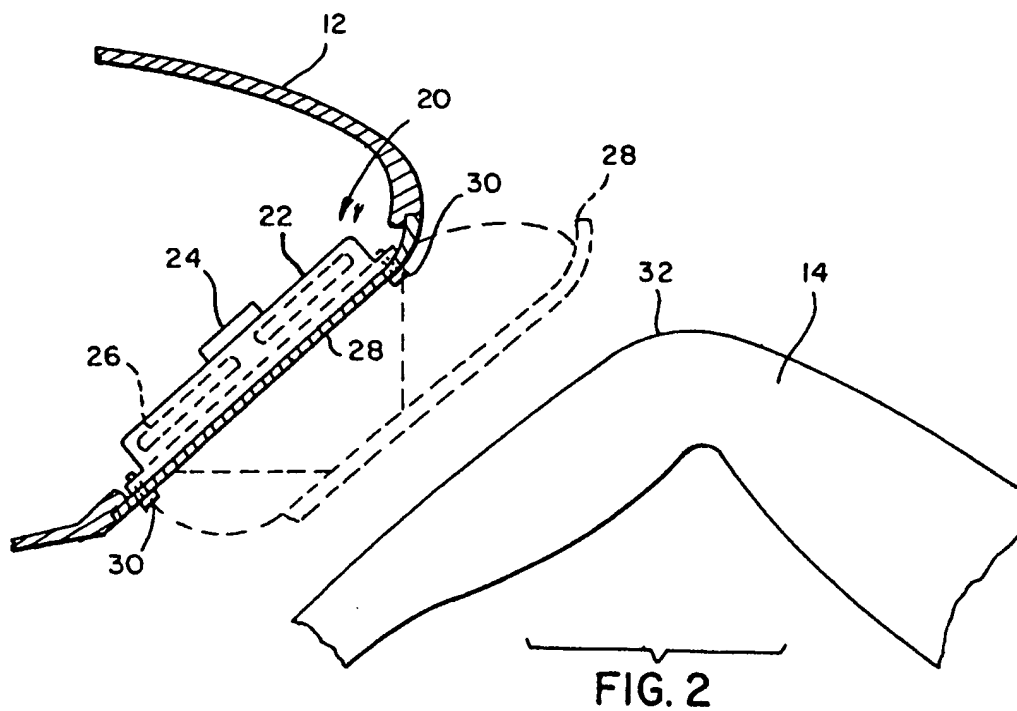
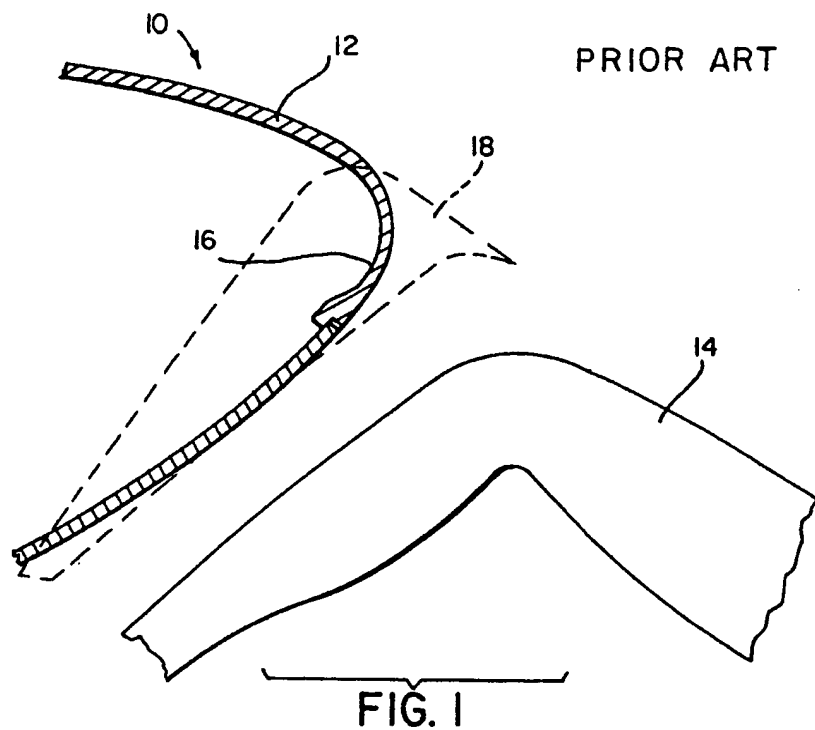
11. Airbagbetätigtes Kniepolster nach einem der vorausgehenden Ansprüche, bei dem der Airbag (26) aus Nylonstoff gefertigt ist.
12. Airbagbetätigtes Kniepolster nach einem der Ansprüche 1 bis 10, bei dem der Airbag aus Polyesterstoffmaterial gefertigt ist.
13. Airbagbetätigtes Kniepolster nach einem der vorausgehenden Ansprüche, bei dem das diagonale Halteseil (50) so angeordnet ist, daß es straff gespannt ist, wenn die Kniepolsterplatte (28) in einer zurückgezogenen Position ist.

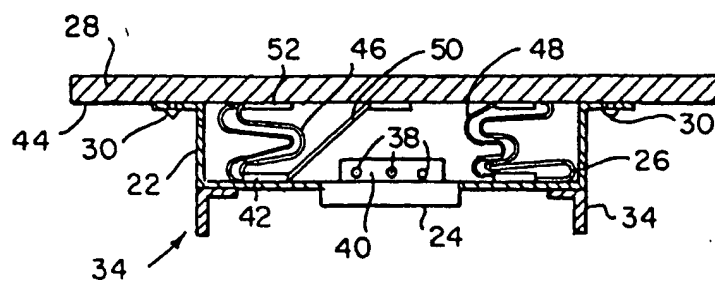
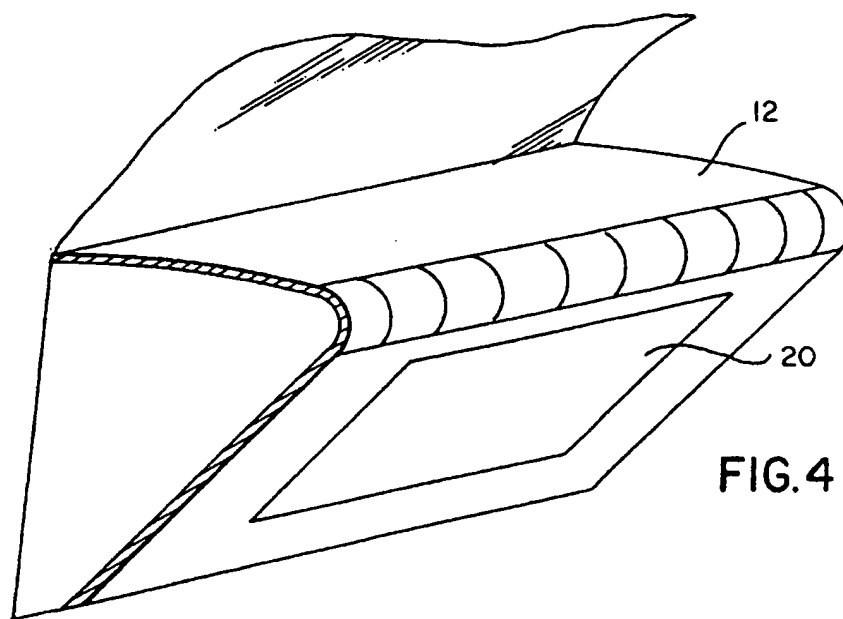
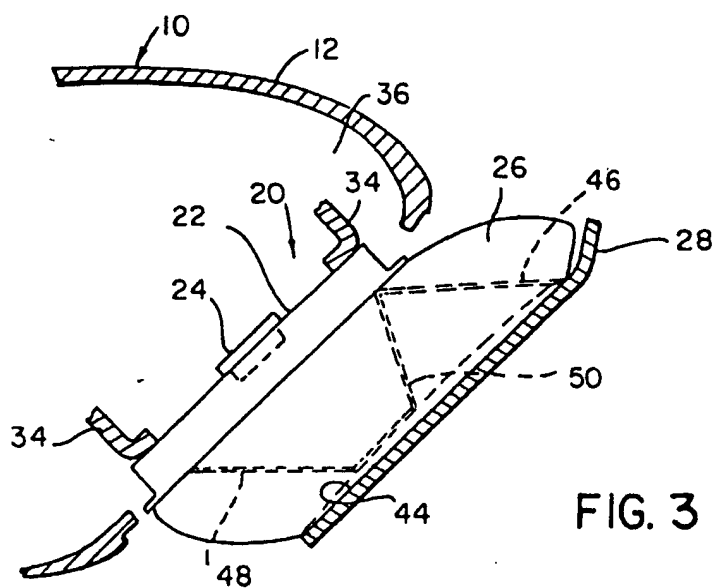
Revendications

1. Appuie-genoux (20) activé par sac gonflable, qui est déployé dans un véhicule automobile lors d'une collision pour assurer la retenue de la partie inférieure du torse d'un occupant assis dans le véhicule, comprenant :

un élément de support (34) situé derrière une partie inclinée vers le bas et l'avant de la planche de bord (12) du véhicule,
un logement (22) monté solidement sur ledit élément de support,
un gonfleur (24) monté dans ledit logement,
un sac gonflable (26) replié rangé dans ledit logement,
un panneau appuie-genoux (28) pour ledit gonfleur et ledit sac gonflable rangés dans ledit logement, ledit panneau comprenant aussi la porte d'une ouverture de déploiement du sac gonflable qui est formée dans une partie de la planche de bord dudit véhicule automobile, un moyen de fixation (30) positionnant ledit panneau appuie-genoux dans l'ouverture de déploiement du sac gonflable qui est formée dans une partie de la planche de bord (12) du véhicule automobile, et
un moyen d'attache (46, 48, 50) pour limiter le déplacement arrière dudit panneau appuie-genoux pendant le déploiement, au moyen duquel le sac gonflable, une fois gonflé, conjointement avec ledit moyen d'attache, positionne ledit panneau appuie-genoux dans l'emplacement approprié pour assurer la retenue de la partie inférieure du torse de l'occupant assis dans ledit véhicule, caractérisé en ce que ledit moyen d'attache est situé à l'inté-

- rieur du sac gonflable replié et comprend des attaches parallèles (46, 48) espacées et au moins une attache diagonale (50), une première extrémité de chacune desdites attaches étant fixée audit logement et l'attache diagonale étant disposée de manière à forcer le panneau appuie-genoux, lors du déploiement, à se déplacer suivant un arc, déterminé par la longueur de l'attache diagonale, en réduisant ainsi la charge imposée aux attaches par l'impact. 5 10
2. Appuie-genoux activé par sac gonflable, tel que défini dans la revendication 1, dans lequel ledit moyen de fixation (30) comprend un moyen de fixation dudit panneau appuie-genoux (28) audit logement (22). 15
 3. Appuie-genoux activé par sac gonflable, tel que défini par la revendication 2, dans lequel ledit moyen de fixation (30) comprend des fixations en plastique. 20
 4. Appuie-genoux activé par sac gonflable, tel que défini par la revendication 3, dans lequel les fixations en plastique (30) comprennent des rivets enfoncés par pression et conçus pour se briser à une force prédéterminée. 25
 5. Appuie-genoux activé par sac gonflable, tel que défini par la revendication 2, dans lequel ledit moyen de fixation comprend des languettes déchirables (54, 56) ayant des zones de déchirement perforées (60) conçues pour se briser à une force prédéterminée et fixant ledit panneau appuie-genoux audit logement (22). 30 35
 6. Appuie-genoux activé par sac gonflable, tel que défini par l'une quelconque des revendications 2 à 5, dans lequel, lors de l'activation dudit gonfleur (24) et du déploiement dudit airbag (26), la pression agissant à l'arrière dudit panneau appuie-genoux (28) et exercée par le sac gonflable crée une force suffisante pour séparer ledit panneau appuie-genoux dudit logement (22), en permettant ainsi le déplacement arrière dudit panneau appuie-genoux pendant le déploiement. 40 45
 7. Appuie-genoux activé par sac gonflable, tel que défini par l'une quelconque des revendications précédentes, dans lequel ledit moyen d'attache (46, 48, 50) comprend une sangle en polyester d'environ 2,5 cm (un pouce) de largeur. 50
 8. Appuie-genoux activé par sac gonflable, tel que défini par l'une quelconque des revendications 1 à 6, dans lequel ledit moyen d'attache (46, 48, 50) comprend une sangle en nylon d'environ 2,5 cm (un pouce) de largeur. 55
9. Appuie-genoux activé par sac gonflable, tel que défini par la revendication 7 ou la revendication 8, dans lequel la sangle a une épaisseur de 1,27 à 2,54 mm (cinquante millièmes à un dixième de pouce).
 10. Appuie-genoux activé par sac gonflable, tel que défini par l'une quelconque des revendications précédentes, où la section du sac gonflable (26), lorsqu'il est gonflé, est celle d'un rectangle, et où ledit moyen d'attache (46, 48, 50) comprend une sangle en polyester ou en nylon repliée en avant et en arrière entre ledit logement et ledit panneau appuie-genoux (28).
 11. Appuie-genoux activé par sac gonflable, tel que défini par l'une quelconque des revendications précédentes, où ledit sac gonflable (26) est réalisé en tissu de nylon.
 12. Appuie-genoux activé par sac gonflable, tel que défini par l'une quelconque des revendications 1 à 10, où ledit airbag est fabriqué en tissu de polyester.
 13. Appuie-genoux activé par sac gonflable, tel que défini par l'une quelconque des revendications précédentes, où ladite attache diagonale (50) est agencée de manière à être tendue lorsque ledit panneau appuie-genoux (28) est en position rétractée.





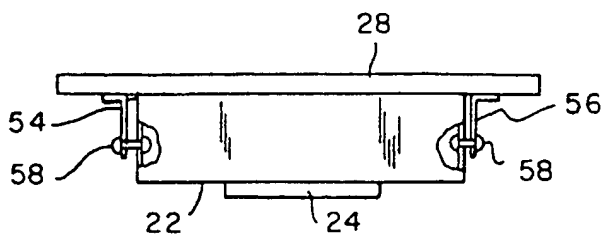


FIG. 6

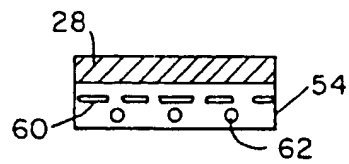


FIG. 7